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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte HELMUT BÖNNEMANN, WERNER BRIJOUX, RAINER
BRINKMANN, NINA MATOUSSEVITCH,
and NORBERT WALDOFNER

Appellants

Appeal 2010-001282
Application 10/518,703
Technology Center 1700

Decided: 8 April 2010

Before SALLY GARDNER LANE, RICHARD E. SCHAFER, and
RICHARD TORCZON, *Administrative Patent Judges*.

LANE, *Administrative Patent Judge*.

DECISION ON APPEAL

I. STATEMENT OF THE CASE

The appeal, under 35 U.S.C. § 134(a), is from a Final Rejection of Appellant's claims 1-18. We have jurisdiction under 35 U.S.C. § 6(b). We affirm-in-part.

Appellant's application is directed to magnetic nanocolloids and particles. (Spec. 1).

The Examiner relied on the following patent references:

| <u>Name</u> | <u>Number</u> | <u>Date</u> | <u>Abbreviation</u> |
|------------------|---------------|----------------|---------------------|
| Bönnemann et al. | 6,351,304 | March 11, 2003 | B'304 |
| Bönnemann et al. | 5,308,377 | May 3, 1994 | B'377 |

The Examiner also relied upon Sun et al., "Monodisperse FePt Nanoparticles and Ferromagnetic FePt Nanocrystal Superlattices," *SCIENCE*, vol. 287, pp. 1989-92 (2000) ("S287").

The Examiner rejected claims 1-2, 5-7, 9, and 12-13 under 35 U.S.C. § 103(a) over S287 and B'377. Appellants discussed claims 12 and 13, as a group, separately from the other rejected claims. We focus on claims 1 and 12 in our review. *See* 37 C.F.R. § 41.37(c)(vii).

The Examiner also rejected claim 10 under 35 U.S.C. § 103(a) over S287, B'377, and the admitted prior art in Appellant's specification.

Finally, the Examiner rejected claims 3, 4, 8, 11, and 14-18 under 35 U.S.C. § 103(a) over S287, B'377, and B'304. Appellants discussed claims 14-18, as a group, separately from the other rejected claims. We focus on claims 3 and 14 in our review. *See* 37 C.F.R. § 41.37(c)(vii).

II. PRINCIPLES OF LAW

In determining whether subject matter is obvious

[o]ften, it will be necessary for a court to look to interrelated teachings of multiple patents . . . ; the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis should be made explicit.

KSR Int’l v. Teleflex Inc., 550 U.S. 398, 418 (2007).

“[W]hen the PTO shows sound basis for believing that the products of the applicant and the prior art are the same, the applicant has the burden of showing that they are not.” *In re Spada*, 911 F.2d 705,708 (Fed. Cir. 1990).

III. FINDINGS OF FACT

1. Appellant’s claim 1 recites:

A process for the preparation of magnetic particles, said process comprising decomposing low-valency compounds of the metals of the magnetic particles in the presence of an organometallic compound of a metal of group 13.

(App. Br. 20, Claims App’x).

2. S287 teaches preparing iron-platinum (FePt) nanoparticles by reduction of platinum acetylacetonate and decomposition of iron pentacarbonyl. (S287 abstract).

3. FePt is a magnetic material, wherein iron pentacarbonyl is a low-valency metallic compound of FePt. (*See* Ans. 3).

4. S287 explains further that a diol or polyalcohol (such as 1,2-hexadecanediol) is used to reduce a metal salt, such as platinum acetylacetonate, in a “polyol process” and that thermal decomposition is used to produce Fe from iron pentacarbonyl. These processes are said to

make Pt and Fe particles available for association into a nanoparticle. (S287 1989, middle col. and FN 21).

5. In S287 the reduction of metal salts is accomplished with a diol or a polyalcohol, such as long-chain 1,2-hexadecanediol, in the polyol process. (S287 1989, middle col. and FN 21).

6. S287 does not teach reducing metal salts with any other process.

7. S287 does not teach that the decomposition to prepare the magnetic particles occurs in the presence of an organometallic compound of a metal of group 13.

8. B'377 teaches preparing metal particles by forming complexes with organoboron and/or organogallium complexing agents (where boron and gallium are Group 13 elements). (B'377 col. 1, ll. 51-55, and col. 2, ll. 36-51).

9. B'377 teaches that the organoboron and/or organogallium complexes allow metal hydrides to act as reducing agents for metal salts, thus allowing metal or alloy powder to be recovered by simple filtration. (B'377 col. 1, ll. 51-55, and col. 2, ll. 36-51).

10. B'377 teaches reducing metal salts with metal hydrides, not with diol or polyalcohol as the reducing agent, as taught in S287.

11. Appellants' claim 12 recites:

A monometallic or polymetallic magnetic particle having a mean particle size, determined by TEM, of between 2 and 15 nm and a particle size distribution with a standard deviation of not more than 1.6 nm.

(App. Br. 21; Claims App'x).

12. S287 teaches FePt particles with a size that can be controlled (“tunable”) from 3- to 10- nanometer diameter with a standard deviation of less than 5%. (S287 abstract).

IV. ISSUE

Would there have been a reason for those in the art to have used an organometallic compound of metal group 13 in the reduction and decomposition reactions that produce FePt nanoparticles taught in S287?

Does S287 teach mono- or polymetallic particles of between 2 and 15 nm, with a particle size distribution with a standard deviation of not more than 1.6 nm?

V. ANALYSIS

Appellants claim a process wherein low-valency compounds are decomposed in the presence of organometallic compounds of group 13 of the Periodic Table to form magnetic particles. (FF¹ 1). S287 teaches preparing iron-platinum nanoparticles by reducing platinum acetylacetonate and decomposing iron pentacarbonyl. (FF 2). In S287 the reduction of metal salts is accomplished with a diol or a polyalcohol, such as long-chain 1,2-hexadecanediol, in a polyol process. (FFs 4 and 5). S287 does not teach any other compounds or processes for reduction of metal salts. (FF 6). The process taught in S287 differs from the claimed process because S287 does not teach that the decomposition occurs in the presence of an organometallic compound of group 13 (FF 7).

¹ “FF” indicates Finding of Fact.

B'377 teaches preparing metal particles using organoboron and/or organogallium complexing agents. (FF 8). In the process taught in B'377, the organoboron and/or organogallium complexes allow metal hydrides to act as reducing agents for metal salts, thus allowing metal or alloy powder to be recovered by simple filtration. (FF 9).

According to the Examiner, B'377 "uses a similar organometal agent with the similar metal salts for producing the same metals or metal alloys in powder or colloidal particles." (Ans. 4). The Examiner concludes that it would have been obvious to those in the art to use an organometallic compound of Group 13 to get the advantage of recovery by simple filtration. (Ans. 4). Furthermore, according to the Examiner, the reduction of platinum acetylacetonate and decomposition of iron pentacarbonyl as taught by S287 is a metal hydride process and so is similar to the chemical reactions taught in B'377². (Ans. 10). Thus, the Examiner finds reason why those of skill in the art would have combined the teachings of S287 and B'377.

Appellants disagree, arguing that B'377 teaches using metal hydrides only as reducing agents, in contrast to the process in S287, which does not use metal hydrides as reducing agents. (App. Br. 8). According to Appellants, S287 and B'377 rely on different processes so that those of skill in the art would not have had a reason to combine their teachings. (App. Br. 9).

² The Examiner refers to B'304 when discussing the teaching of a metal hydride process. (Ans. 10). We assume the reference should have been to B'377, because discussion is in response to Appellants' argument about B'377 (*see* Ans. 9; App. Br. 7-8).

Beyond saying they are “similar,” the Examiner does not explain why those of skill in the art would have used the organometallic compounds of B’377 in the process taught in S287. The processes taught in S287 and B’377 are distinct: one relies on polyols, which are non-metal organic compounds, to reduce, while the other relies on metal hydrides. We find no indication in S287 that the polyols can be substituted with any other reducing agents, let alone with metal hydrides. Similarly, we find no indication in B’377 that metal hydrides can be used in the place of polyols as reducing agents. The Examiner fails to explain how either reference suggests such a substitution. While an express suggestion in the references is not necessary to a conclusion of obviousness, a sufficient reason why one skilled in the art would have modified the prior art to arrive at the claimed invention is. *See KSR*, 550 U.S. at 418. The Examiner’s finding that the reactions are “similar” is not sufficient reason. Without further explanation, we are not persuaded that those in the art would have combined the teachings of S287 and B’377 to make a process using an organometallic compound of a metal of Group 13 in the decomposition reaction recited. *See KSR*, 550 U.S. 418. Accordingly, the Examiner fails to present a *prima facie* case for the obviousness of the claimed method.

The Examiner rejected Appellants’ claims 3 and 10 under 35 U.S.C. § 103(a) over S287, B’377, and B’304 or the admitted prior art in Appellants’ specification, respectively. Appellants’ claim 3 requires that the “mean particle size is established by the nature and concentration of the organometallic compound” (App. Br. 20, Claims App’x), while Appellants’ claim 10 requires that the decomposing step of the process of claim 1 be “effected by photolysis or sonochemically” (App. Br. 21, Claims App’x).

Because both of these rejections are based on the *prima facie* case, including the reason to combine the teachings of S287 and B'377, put forth by the Examiner in regard to claim 1, these rejections were made in error.

Appellants' claim 12 recites a magnetic particle within a recited range of specific particle size and particle size distribution. (FF 11). S287 teaches FePt magnetic particle that fall with the recited range of particle size and particle size distribution. (FF 12). Thus, S287 teaches the claimed particle, *see Spada*, 911 F.2d at 708, regardless of the process by which it is produced (*contra* App. Br. 13). The Examiner did not err in rejecting claim 12 under 35 U.S.C. § 103(a). *See In re McDaniel*, 293 F.3d 1379, 1385 (Fed. Cir. 2002) ("It is well settled that 'anticipation is the epitome of obviousness.'"(citation omitted)).

Appellants' claim 14 recites the magnetic particle of claim 12, "which is protected by aftertreatment with air." (App. Br. 21, Claims App'x). B'304 teaches that Fe colloids can be aftertreated with oxygen, a component of air, to form protective shells, and also teaches that these shells are useful in medical applications. (*See* B'304 col. 4, ll. 12-15). Appellants do not dispute that it would have been obvious to those in the art to protect the particles of claim 12 with aftertreatment with air, only that there would not have been a reason to combine S287 and B'377 to render the process of making the particles obvious. (*See* App. Br. 17-18). For the reasons stated above, Appellants have not persuaded us that the Examiner erred in finding the claimed particles to have been taught in the prior art.

VI. CONCLUSION

The Examiner has not shown that there would have been a reason for those in the art to use an organometallic compound of metal group 13 in the reduction and decomposition reactions that produce FePt nanoparticles taught in S287.

S287 teaches mono- or polymetallic particles of between 2 and 15 nm, with a particle size distribution with a standard deviation of not more than 1.6 nm.

VII. ORDER

Upon consideration of the record and for the reasons given,
the rejection of claims 1-2, 5-7, and 9, and 12-13 under 35 U.S.C. § 103(a) over S287 and B'377 is REVERSED;

the rejection of claims 12-13 under 35 U.S.C. § 103(a) over S287 and B'377 is AFFIRMED;

the rejection of claim 10 under 35 U.S.C. § 103(a) over S287, B'377, and the admitted prior art in Appellant's specification is REVERSED;

the rejection of claims 3, 4, 8, and 11 under 35 U.S.C. § 103(a) over S287, B'377, and B'304 is REVERSED; and

the rejection of claims 14-18 under 35 U.S.C. § 103(a) over S287, B'377, and B'304 is AFFIRMED.

FURTHER ORDERED that no time period for taking any subsequent action in connection with the appeal may be extended under 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED-IN-PART

Appeal 2010-001282
Application 10/518,703

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